

## BACKGROUND OF THE INVENTION

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## 2. Description of the prior art

Standard music notation includes the familiar five-line staff and notes and is used to play basically all instruments. A consequence of this universality is that it makes it necessary for an aspiring piano player to first mentally determine the note name by its notational symbol and second physically find the note on the keyboard. To further complicate the matter, the same note appears on different locations of different staves. In addition the key signatures alters the relationship between the note seen and the key pressed.

A number of keyboard instruction devices have been devised to help learn the standard musical notation system. A great many number of altogether different music notation systems associated or not with a device have been designed, some successfully like the tablatures for guitar play, but most remained unused.

A dedicated keyboard instruction display and associated music notation that create mental pictures directly usable in order to play the piano and memorize pieces has not yet been devised. Therefore an object of this invention is to provide this and introduce the notion of musical "words" referenced here as pianopics.

## SUMMARY OF THE INVENTION

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A definition for the new word "pianopic" referenced throughout this document is as follows: a graphical representation of a musical event involving none, one, or more notes, usually depicted as a scale bar diagram composed of black and white rectangular shapes placed side by side in an arrangement matching the twelve keys of an octave on a piano keyboard, from which hang none, one, or more black and/or white rectangles indicating the actual piano keys to strike. The pianopic may include above the scale bar a timing diagram composed of a numeral on top of each key representation matching the number of beats that key is held down, and a path starting with a dot, ending with an arrow, thus indicating the order in which the keys are struck. The scale bar may show on its left or its right side an octave symbol marker, usually one or more ar-

rows, indicating a shift of one or more octaves respectively to the left or the right from the middle "C" octave located in the center of the piano.

### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows the pianopics display illuminated for a 2 hand musical sequence using five keys, and a partial piano keyboard and the scale bars ruler slipped behind the piano keys helping correlate the piano keys to be struck with their representation on the pianopics display.

FIG. 2 shows the scale bars ruler.

FIG. 3 shows a couple of timing diagrams.

The first one involves the same note struck twice. the first time for a duration of three beats and the second time for the duration of two beats.

The second diagram involves three notes struck in succession for three, two, and three beats respectively.

FIG. 4 shows a scale bar with one arrow pointing to the right, thus indicating that the playing hand should be shifted one octave to the right of middle "C".

FIG. 5 shows how the keys are represented: a white rectangle for a white key and a smaller black rectangle for a black key hanging from and lined up with their counter parts on the scale bar.

FIG. 6 shows the top portion of a timing diagram. the "bouncing ball" and its path ending with the arrowhead indicating the order in which the keys are to be struck.

FIG. 7 shows three tone length indicators measured in number of beats.

FIG. 8 shows a set of left hand and right hand pianopics as it appears on the printed page, set up in a vertical manner so as to maintain the vertical alignment of the keys.

FIG. 9 shows a tempo indicator of thirty beats per minute, each beat lasting two seconds. This is the setting for a metronome. It is used to change on the fly the duration of the beat unit thus allowing variations in the speed of play while maintaining simplicity in the notation.

FIG. 10 shows a rest which is merely a timed symbol without a corresponding key.

FIG. 11 shows how a tied note is represented. When a key is to be struck in one

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## REFERENCE NUMERALS IN DRAWINGS

- 1 Scale Bar
- 2 Scale bar Arrowhead
- 3 Bouncing Ball
- 4 Path
- 5 Path end Arrowhead
- 6 White key representation
- 7 Black key representation
- 8 Tone length Indicator
- 9 Key toggle switch
- 10 Tone length Indicator temporary switch
- 11 Legato play timing circle shadow
- 12 Scale bar arrow toggle switch
- 13 Timing circle diagram
- 14 Electrical bulb for a scale bar
- 15 Electrical bulb for a right arrow
- 16 Electrical bulb for a timing circle
- 17 Electrical bulb for a left arrow in a side view
- 18 Electrical bulb for a black key shape
- 19 Electrical bulb for a white key shape
- 20 Electrical bulb for a left arrow
- 101 Top plate with predrawn pianopics shapes
- 1501 Top plate of manually operated device with predrawn pianopics shapes
- 1502 Electric bulbs
- 1503 Electrical switches
- 1504 Electrical power source
- 1601 Top plate of automatically operated device with predrawn pianopics shapes
- 1602 Electric bulbs of automatically operated device
- 1603 Control unit
- 1604 Memory unit
- 1605 Solid state type electrical switches

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For each shape predrawn on the front plate there is one switch, one bulb, and one wire connecting it to the electrical energy source. The temporary switches **10** are used to light up the circles **13** positioned above the scale bar **1**, each one switch **10** is located directly above a key shape. The toggle switches **9** are used to illuminate the white and black rectangles **6** and **7** respectively and are positioned below the keys, one for each key location in the scale bar **1**. Extra toggle switches **12** are placed just below the arrows **2** and activate these.

The pianopics display in Fig.1 is operated by the instructor in front of the pupil. The teacher depresses the toggle switches 9 first in order to light up the keys of the scale bar 1 and the arrows, thus giving the pupil the necessary information to locate on the piano keyboard which keys are to be struck. Then the teacher depresses the temporary switches on top of the display which correspond to the lighted key shapes 6 and 7 for the proper duration and in the proper order thus giving the pupil the necessary information about the rhythm for that sequence of notes. The pupil then replicates this event on the piano, using one's fingers as substitutes for the lighted circles.

In a preferred embodiment of which FIG. 16 is a block diagram, the electrical switches 9 are of the solid state type and are triggered by the control unit 1603, in a predefined sequence following instructions residing in the memory unit 1604, thus automating the teacher's sequence of actions. The memory unit 1604 holds an encoded datafile following the sample pianopics file format 2001. Each data record includes a bulb# corresponding to a specific bulb behind a specific shape of the top plate 1601, a beat# indicating the specific moment in time the event involving the bulb will take place, and an electrical state of ON or OFF indicating the nature of the event: bulb ON or bulb OFF. The control unit 1603 is built with digital circuitry, follows the flowchart of FIG. 20 and processes a data file of type 2001 stored in the memory unit 1604, one record at a time until the end of file marker is reached.

In preferred embodiments of which FIG. 17 is a block diagram, the electro-optical device is a liquid cristal, electroluminescence, plasma, or holographic display device, while the memory unit is a digital storage device such as memory chip, memory card, floppy disk, or CD rom in any combination of display and memory types. The user input

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The pianopics musical notation in Fig.8 resembles closely the pianopics musical keyboard instruction display device in Fig.1 once it has been lit up. However since a timed event occurs when the display is operated as the circles light up rhythmically, the notation reflects this by using numerals 8 inside the circles of Fig.7 to signify how long each corresponding key is to be held down. The tone length is measured in number of beats. Fig. 6 shows the path diagram representing the order in which the keys are to be pressed. The dot 3 can be thought of as a bouncing ball following the path that ends with the arrowhead. The first key to be pressed is the one which tone duration circle 8 lies below the dot 3. The next key is the one that lie on the path 4 of the bouncing ball and the last key is the one with the arrowhead 5 on top of its duration circle 8. Fig. 3 shows two such timing diagrams, the first one lasting five beats, the second one lasting



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Although the description above contains many specificities, these should not be construed as limiting the scope of the invention but as merely providing illustrations of some of the presently preferred embodiments of this invention.

For example, the display can include only one hand pianopics generator with or without scale shifting arrows, using permanently lit circled numerals instead of temporarily lit circles, or it might show two or more lines of two hand PianoPics designed to help in developing reading speed.

Also the shapes of all the components used to represent the keys or timing may be different such as ovals, trapezoidal, triangular, or a combination of elementary shapes. In addition, the display could also be the visual part of a computer software program showing on a computer monitor.

Thus the scope of the invention should be determined by the appended claims and their legal equivalents, rather than by the examples given.

What is claimed is:

✓ 1. A musical keyboard instruction device comprising:

a marking device in the form of a three scale bar ruler consisting of three sets of five dark and seven light rectangular shapes matching in width the black and white keys of a piano when placed behind these, with an octave symbol marker on the extreme left and an octave symbol marker on the extreme right;

a musical notation system based on indicia consisting each of one scale bar, dark and light rectangular shapes extending down from some of the rectangular shapes of the scale bar and meant to represent actual piano keys.

2. The system of claim 1 wherein the indicia include numerals positioned above the scale bar which includes an octave symbol marker, and vertically lined up with the rectangular shapes representing piano keys, said numerals indicating the number of beats each note gets, a path consisting of starting symbols, line segments, and ending symbols connecting the numerals in an order defined by placing a starting symbol above each starting note numeral, a line segment linking a starting note numeral with an intermediate note numeral, and an ending symbol above an ending note numeral, said path thus indicating the order in which the piano keys are pressed, said indicia representing a musical event involving one or more notes.

3. An electro-optical musical keyboard instruction device for music written in the music notation system of claim 2 comprising:

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